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First record of albinism in the rockfish *Sebastes pachycephalus* complex (Scorpaeniformes: Scorpaenidae)

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Short running head: Albinism in *Sebastes pachycephalus* complex

News and Comments

Text 7 pp, Figure 1 page.

Albinism, a condition resulting from a group of genetically determined disorders of the melanin pigmentary system (Kinnear et al. 1985), occurs in two forms: (1) complete albinism, which is phenotypically expressed as a lack of integumentary and retinal melanin, indicating defects in the integumentary and retinal melanophores, and (2) partial albinism or leucism. The latter describes an individual with reduced or absent integumentary pigment, but with pigmented retinas, resulting in diminished or no body coloration and darkly pigmented eyes. Primarily used in herpetological literature, the term leucism has recently been suggested as appropriate for ichthyology (Clark 2002). Complete albinism and leucism have been reported in numerous teleost species (e.g., Follett and Dempster 1966; Huzita and Nishino 1966; Dawson 1967; Shinohara and Amaoka 1993; Delgado et al. 2009; Mansur 2011; Pillai and Somvanshi 2011), as well as among chondrichthyans (e.g., Talent 1973; Ishihara et al. 2001; Bottaro et al. 2005; Sandoval-Castillo et al. 2006; Reum et al. 2008; Veena et al. 2011). However in rockfishes of the genus *Sebastes* Cuvier 1829, only one record of albinism has been documented to date [Follet and Dempster 1966, as *Sebastodes melanostomus* (Eigenmann and Eigenmann 1890)], an unusual example of leucism, termed “melanalbinism” by the authors. On 28 February 2012, a single leucistic individual of *Sebastes pachycephalus* complex was captured alive in a basket trap in Kamaishi Bay, Iwate Prefecture, Japan (Fig. 1). A brief description of the specimen is given below.

Morphological characters were examined following Muto et al. (2011) except for the lower jaw length, which was taken as the distance between the symphysis and the posteriormost point of the dentary, after fixation in 10 % formalin and preservation in 70 % ethanol. Terminology of the head spines follows Randall and Eschmeyer (2001). Counts and measurements were taken from the right side of the body, the left side having been damaged. The specimen was deposited in the Kyoto University Fish Collection (FAKU).

Description (based on FAKU 134960, 245.3 mm in standard length). The following

measurements are expressed as percentage of standard length: head length 41.3; snout length 10.5; orbital length 8.6; postorbital length 22.6; upper jaw length 18.3; lower jaw length 16.6; body width 25.6; caudal peduncle depth 12.1; preanal length 68.2; predorsal length 32.7; prepelvic length 46.9; longest dorsal-fin spine (both fourth and fifth) length 15.3; longest dorsal-fin soft ray (fourth) length 16.4; first anal-fin spine length 8.1; second anal-fin spine length 14.3; third anal-fin spine length 13.7; longest anal-fin soft ray (second) length 19.2; pectoral-fin length 29.0; pelvic-fin length 22.1; pelvic-fin spine length 13.7.

Dorsal-fin rays XIII, 12; anal-fin rays III, 6; pectoral-fin rays 17; pored lateral line scales 31; gill rakers on upper limb 7, lower limb 16, short and blunt. Body relatively deep and moderately compressed anteriorly, progressively more compressed posteriorly. Head covered with ctenoid scales, except for tip of snout, maxilla, lacrimal, lower jaw, interopercle, isthmus and branchiostegal rays. Posterior part of maxilla naked. Base of spinous dorsal fin naked from below first spine to 12th spine; small scales present posteriorly from below 12th spine to last dorsal-fin ray. Mouth large, slightly oblique; posterior margin of maxilla reaching level of middle of eye. Lower jaw not protruding beyond upper jaw, without distinct symphysial knob. Nasal spine simple, sharp, directed dorsally. Head armed with preocular, supraocular, postocular and parietal spines; all spines robust and well developed. Supracleithral spine simple, directed posteriorly. Interorbital space concave without ridge. Upper posttemporal spine flattened, its base embedded; lower posttemporal spine absent. Sphenotic, tympanic, pterotic and nuchal spines absent. Anterior lacrimal rounded, without distinct spine; posterior lacrimal spine flattened, sharp, directed ventroposteriorly.

Body, head and all fins uniformly white; a small number of melanophores on side of trunk above and below lateral line, and on soft rays of dorsal, anal, pectoral and caudal fins. Eye black. Peritoneum white.

Remarks. *Sebastes pachycephalus* Temminck and Schlegel 1843 is commonly found in

coastal shallow-water rocky areas from southern Hokkaido southward to Kyushu, Japan and off the Korean Peninsula (Nakabo 2002). However, the species has been subject to much taxonomic confusion due to variations in body color and other morphological characters. Whereas Matsubara (1943) and Nakabo (2002) recognized four subspecies of *S. pachycephalus*, *Sebastes pachycephalus pachycephalus* Temminck and Schlegel 1843, *Sebastes pachycephalus nigricans* (Schmidt 1931), *Sebastes pachycephalus nudus* Matsubara 1943 and *Sebastes pachycephalus chalcogrammus* Matsubara 1943, Amaoka (1984) and Amaoka et al. (2011) did not consider the variations as being taxonomically significant, recognizing simply *S. pachycephalus*. Except for body coloration, the present specimen most closely resembled *S. p. nudus* or *S. p. chalcogrammus* sensu Matsubara (1943) and Nakabo (2002) in having robust head spines, concave interorbital space, short lower jaw lacking scales, thickened rays in ventral half of pectoral fin, dorsal fin with 13 spines and 12 rays, anal fin with three spines and six rays, 17 pectoral-fin rays, 31 lateral line pores, and scales absent on base of spinous dorsal fin below first to 12th spines. Recently, Kai et al. (2011) recognized two distinct species within the *S. pachycephalus* complex, referring to them as “Species P-Ni” and “Species Nu-C”, on the basis of genetic and morphological differences. According to Kai et al. (2011), “Species P-Ni” is characterized by lacking distinct markings on the dorsum, (usually) small scales occurring along the entire base of the spinous dorsal fin and having 17–19 (mode 18) pectoral-fin rays, thereby being referable to *S. p. pachycephalus* and *S. p. nigricans* of Matsubara (1943). “Species Nu-C”, on the other hand, is characterized by having yellow or brownish-red markings on the dorsum, (usually) small scales on the spinous dorsal fin base restricted to below the fifth or more posterior spines and 16–18 (mode 17) pectoral-fin rays, thereby being referable to *S. p. nudus* and *S. p. chalcogrammus* of Matsubara (1943). The present specimen was therefore considered to be conspecific with “Species Nu-C” of Kai et al. (2011).

The normal body coloration of “Species Nu-C” is brownish with yellowish or brownish-red

markings on the dorsum (Kai et al. 2011). The present specimen instead displayed a leucistic phenotype, lacking normal pigmentation over the entire body surface, except for the eyes, a small number of melanophores being coarsely scattered on the sides of the body, operculum and soft rays of the dorsal, anal, pectoral and caudal fins. Although skin color abnormalities are not uncommon in *Sebastes* (Love et al. 2002), most of these so far recorded for the genus represent melanism due to abnormal growth of color-containing cells, resulting in skin tumors (Phillips 1957, 1964). The present (second) example of albinism in *Sebastes* may contribute to our understanding of skin color abnormalities in the genus.

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References

Amaoka K (1984) Genus *Sebastes*. In: Masuda H, Amaoka K, Araga C, Uyeno T, Yoshino T (eds) The fishes of the Japanese Archipelago, English edn. Tokai University Press, Tokyo, pp 310–313

Amaoka K, Nakaya K, Yabe M (2011) Fishes of Hokkaido. The Hokkaido Shimbun Press, Sapporo

Bottaro M, Ferrando S, Gallus L, Girosi L, Vacchi M (2005) First record of albinism in the deep-water shark *Dalatias licha*. Mar Biodivers Rec 1:1–4

Clark S (2002) First report of albinism in the white spotted bamboo shark, *Chiloscyllium*

plagiosum (Orectolobiformes: Hemiscyllidae), with a review of reported color aberrations in elasmobranchs. Zoo Biol 21:519–524

Cuvier G (1829) Le règne animal distribué d'après son organization, pour servir de base à l'histoire naturelle des animaux et d'introduction a l'anatomie comparée, vol 2, 2nd edn. Deterville, Paris

Dawson CE (1967) Three new records of partial albinism in American heterostomata. Trans Am Fish Soc 96:400–404

Delgado J, Carvalho D, Sousa R, Ferreira S, Aveiro MJ (2009) First record of albinism in the deepwater black scabbard-fish *Aphanopus carbo* (Trichiuridae) off Madeira. J Appl Ichthyol 25:483–484

Eigenmann CH and Eigenmann RS (1890) Additions to the fauna of San Diego. Proc Calif Acad Sci 2nd Ser 3:1–24

Follett WI, Dempster LJ (1966) Partial melanalbinism in an scorpaenid fish, *Sebastodes melanostomus* Eigenmann and Eigenmann, from Monterey Bay, California, with selected references to melanism and albinism in fishes. Wasmann J Biol 24:189–198

Huzita S, Nishino K (1966) On an albino of *Sebastolobus macrochir* collected off Cape Erimo, Japan. Jpn J Ichthyol 13:210–212

Ishihara H, Homma K, Nakamura R (2001) The occurrence of albinism in individuals of the manta ray and Japanese common skate found in the western Pacific. I.O.P. Diving News 12:2–5

Kai Y, Nakayama K, Nakabo T (2011) Genetic and morphological divergence within the *Sebastes pachycephalus* complex (Scorpaeniformes: Scorpaenidae). Ichthyol Res 58:333–343

Kinnear PE, Jay B, Witkop Jr. CJ (1985) Albinism. Surv Ophthalmol 30:75–101

158 Love MS, Yoklavich M, Thorsteinson L (2002) The rockfishes of the Northeast Pacific.
159 University of California Press, Berkeley
160 Mansur LE (2011) First record of partial albinism in the temperate rocky reefs fish *Acanthistius*
161 *patachonicus* (*Insertae sedis*) off southwestern Atlantic Ocean. Pan-American J Aquat
162 Sci 6:185–187
163 Matsubara K (1943) Studies on the scorpaenoid fishes of Japan. Anatomy, phylogeny and
164 taxonomy II. Trans Sigenkagaku Kenkyusyo 2:171–486
165 Muto N, Kai Y, Nakabo T (2011) Genetic and morphological differences between *Sebastes*
166 *vulpes* and *S. zonatus* (Teleostei: Scorpaeniformes: Scorpaenidae). Fish Bull
167 109:429–439
168 Nakabo T (2002) Scorpaenidae. In: Nakabo T (ed) Fishes of Japan with pictorial keys to the
169 species, English edn. Tokai University Press, Tokyo, pp 565–595, 1524–1528
170 Phillips JB (1957) A review of the rockfishes of California (Family Scorpaenidae). Calif Dep
171 Fish Game Fish Bull 104:1–158
172 Phillips JB (1964) Life history studies on ten species of rockfish (genus *Sebastodes*). Calif Dep
173 Fish Game Fish Bull 126:1–70
174 Pillai SK, Somvanshi VS (2011) A case of complete albinism in marine cat fish *Arius caelatus*
175 (Valenciennes). Indian J Fish 26:240–241
176 Randall JE, Eschmeyer WN (2001) Revision of the Indo-Pacific scorpionfish genus
177 *Scorpaenopsis*, with descriptions of eight new species. Indo-Pacific Fishes 34:1–79
178 Reum JCP, Paulsen CE, Pietsch TW, Parker-Stetter SL (2008) First record of an albino
179 chimaeriform fish, *Hydrolagus colliei*. Northwest Nat 89:60–62
180 Sandoval-Castillo J, Mariano-Melendez E, Villavicencio-Garayzar C (2006) New records of

albinism in two elasmobranchs: the tiger shark *Galeocerdo cuvier* and the giant electric ray *Narcine entemedor*. Cybium 30:191–192

Schmidt PJ (1931) Fishes of Japan, collected in 1901. Trans Pacific Comm Acad Sci USSR 2:1–176

Shinohara G, Amaoka K (1993) Albino specimen of *Sebastolobus macrochir* collected from off the Shimokita Peninsula, Northern Japan. Jpn J Ichthyol 39:395–397

Talent LG (1973) Albinism in embryo gray smoothhound sharks *Mustelus californicus*, from Elkhorn Slough, Monterey Bay, California. Copeia 1973:595–597

Temminck CJ, Schlegel H (1843) Pisces. Parts 2–4. In: de Siebold PF (ed) Fauna Japonica. Müller, Amsterdam, pp 21–72, pls 10–36

Veena S, Thomas S, Raje SG, Durgekar R (2011) Case of leucism in the spadenorse shark, *Scoliodon laticaudus* (Müller and Henle, 1838) from Mangalore Karnataka. Indian J Fish 58:109–112

196 **Figure legend**

197 **Fig. 1** Aquarium photograph of a leucistic specimen of *Sebastes pachycephalus* complex from

198 Kamaishi Bay, Iwate Prefecture, Japan (FAKU 134960, 245.3mm in standard length)

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